2.5 L6-Special Lines in Triangles

Median: A line that joins vertex of a triangle to th midpoint of the opposite side.

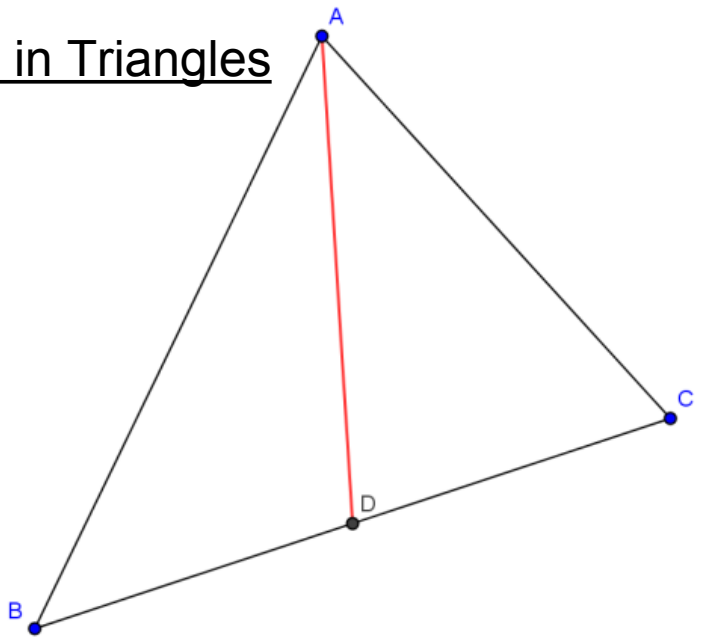
1) Midpoint = M_{BC}

2) $m_{AD} = \frac{y_D - y_A}{x_D - x_A}$

3) Sub A or D into

$y = m_{AD}x + b$

to solve b



Altitude: A line fro to the opposite sid is perpendicular to opposite side.

1) find slope m_{BC}

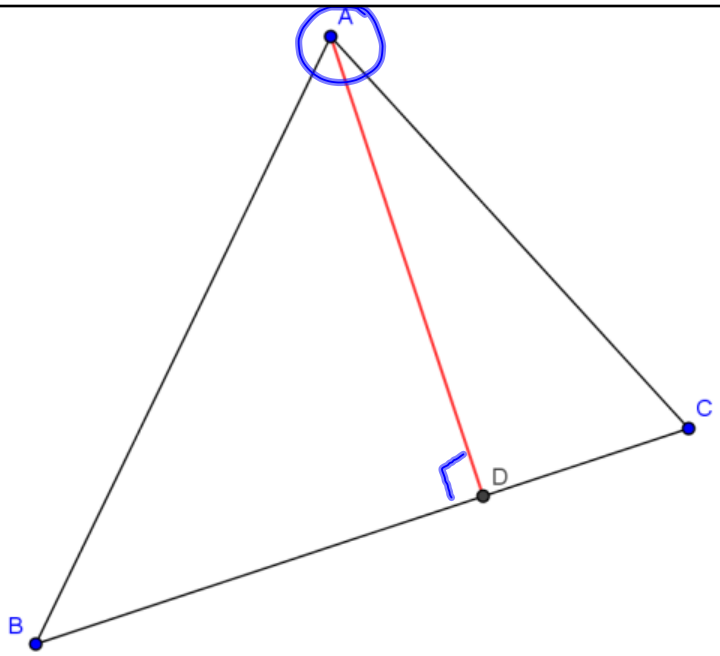
2) state $m_{AD} = -\frac{1}{m_{BC}}$

3) $y = m_{AD}x + b$

4) sub point A into

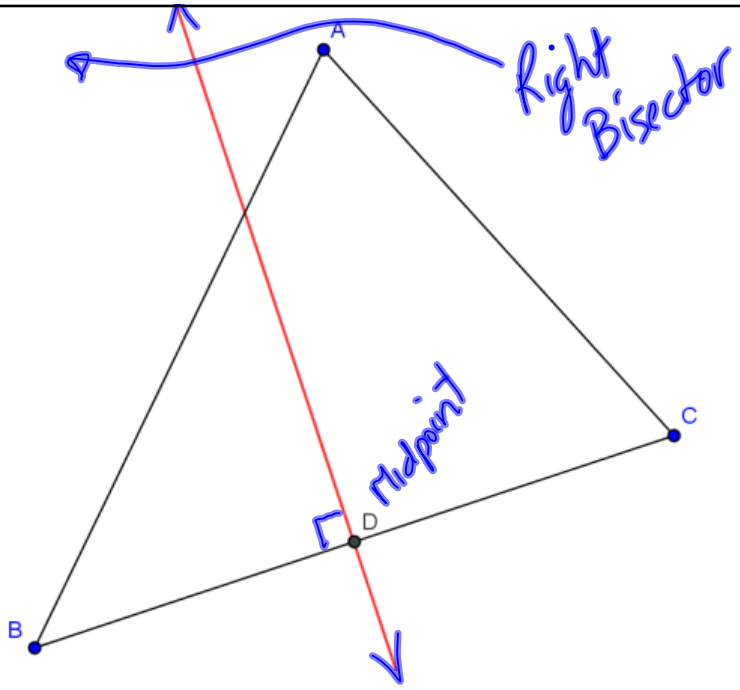
$y = m_{AD}x + b$

to solve b



Perpendicular Bisect

A perpendicular line through the midpoint of a line segment.



1) Midpoint = M_{BC}

2) find slope m_{BC}

3) state $m_{\perp}$ = $-\frac{1}{m_{BC}}$

4) $y = m_{\perp} x + b$

3) Sub D into

$y = m_{\perp} x + b$

to solve b

L6-Special Lines in Triangles

Important: make a sketch so you don't get confused.

Ex. 1 Triangle STU has vertices at S(-2,-3), T(9,4) and U(11, -4).

a. Find the equation of the median from S.

$M_{TU} = \left(\frac{9+11}{2}, \frac{4+(-4)}{2}\right)$

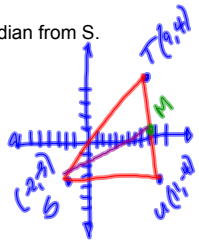
$= (10, 0)$

$m_{SM} = \left(\frac{y-y_1}{x_2-x_1}\right)$

$= \frac{0-(-3)}{10-(-2)}$

$= \frac{3}{12}$

$= \frac{1}{4}$



equation - sub (-2,-3) to solve b

$y = \frac{1}{4}x + b$

$-3 = \frac{1}{4}(-2) + b$

$-3 = -\frac{1}{2} + b$

$-3 + \frac{1}{2} = b$

$b = -2.5$ ✓

∴ the equation of the median is $y = \frac{1}{4}x - 2.5$

Ex.1 continues...
Triangle STU has vertices at S(-2,-3), T(9,4) and U(11, -4).

b. Find the equation of the altitude from U.

① $m_{ST} = \frac{y_2-y_1}{x_2-x_1}$
$= \frac{7}{11}$

② $m_\perp = -\frac{11}{7}$

③ $y = -\frac{11}{7}x + b$ (Sub in U(11,-4) to solve b)

$-4 = -\frac{11}{7}(11) + b$

$-4 = -\frac{121}{7} + b$

$b = -\frac{4}{1} \times \frac{7}{7} + \frac{121}{7}$

$b = -\frac{28}{7} + \frac{121}{7}$

$b = \frac{93}{7}$

∴ The equation of the altitude is

$y = -\frac{11}{7}x + \frac{93}{7}$

Ex.1 continues...
Triangle STU has vertices at S(-2,-3), T(9,4) and U(11, -4).

c. Find the equation of the perpendicular bisector of side TU.

$M_{TU} = \left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$

$= (10, 0)$

$m_{TU} = \frac{y_2-y_1}{x_2-x_1}$

$= -4$

∴ the equation of the right bisector is $y = \frac{1}{4}x - \frac{5}{2}$

$m_\perp = \frac{1}{4}$

$y = \frac{1}{4}x + b$ (Sub in M to solve b)

$0 = \frac{1}{4}(10) + b$

$0 = \frac{10}{4} + b$

$-\frac{10}{4} = b$

$b = -\frac{5}{2}$

Assigned Work:

Triangle ABC has vertices A(3, 4), B(-5, 2) and C(1, -4). Find the equation for the altitude from A to BC.

p.79 #12
p.80 #13
p.102 #4
p.110 #13